

Evaluation of Non-Intrusive Technologies for Traffic Detection

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Introduction

- FHWA & Mn/DOT sponsored test of Non-Intrusive Technologies for traffic detection
- Success of the test has led FHWA to fund Phase II

Definition of Non-Intrusive Technologies

- Easily deployed without disruption of traffic flow
- Safer for staff to deploy

Goals

- Evaluate full capabilities and limitations of devices
- Test in varying weather and traffic conditions
- Test in varying mounting parameters (overhead/sidefire, heights, offset)
- Test all parameters needed for historical and real-time/ITS applications

Goals (continued)

- Develop Evaluation Test Plan
- Establish permanent site for on-going testing of devices

Technology Groups

- Passive Infrared
- Active Infrared
- Magnetic
- Radar
- Doppler Microwave
- Pulse Ultrasonic
- Passive Acoustic
- Video

Vendor-Technology Groups

- Video
 - Boschung Mechatronic
 - Computer Recognition System, Inc
 - Image Sensing Systems
 - Nestor Traffic Systems
 - OMRON
 - Peek Traffic Systems, Inc
 - Traficon NV

Vendor-Technology Groups (continued)

- Passive Infrared
 - ASIM Technologies, Ltd. - 3 products
- Active Infrared
 - Schwartz Electro-Optics, Inc.
- Laser
 - MBB SensTech Traffic GmbH
- Passive Acoustic
 - SmartTek System

Vendor-Technology Groups (continued)

- Microwave
 - Electronic Integrated Systems, Inc.
 - Microwave Sensors - 3 products
- Ultrasonic
 - Novax Industries Corp
- Magnetic
 - 3M

Vendor-Technology Groups (continued)

- Total of 20 devices from 16 different vendors and 8 technologies

Freeway Test Site

- I-394 at Penn Avenue
 - Free flow to heavy congestion
 - Inductive loops in place
 - Three mainline lanes
 - Two reversible HOV lanes
 - Catwalk and adjustable mounting poles
 - Crank-up pole for “side fire” devices

Freeway Test Site



Freeway Test Site



Intersection Test Site

- I-394 at Penn Avenue
 - Multiple lane approaches
 - Unusual geometry
 - Congested in peak periods
 - Inductive loops in place
 - Utilize existing poles

Test Site (continued)

- Other characteristics
 - Space for data collection shelter
 - Nearby railroad track
 - Nearby bicycle and pedestrian trail

Status

- Completed initial organizational work
 - Consultant selection - completed
 - Contract execution - completed
 - Funding is secured - completed
- NIT II local team - completed
 - Quarterly meetings - June, Sept, Dec(2000), March, June (2001)

Status (continued)

- Equipment Shelter
 - Design - completed
 - Construction - in process

Status (continued)

- Vendors/Devices
 - Contacting vendors - first group contact completed, this is an on going process
 - Review devices - completed
 - Order devices - August
 - Install devices - October

Status (continued)

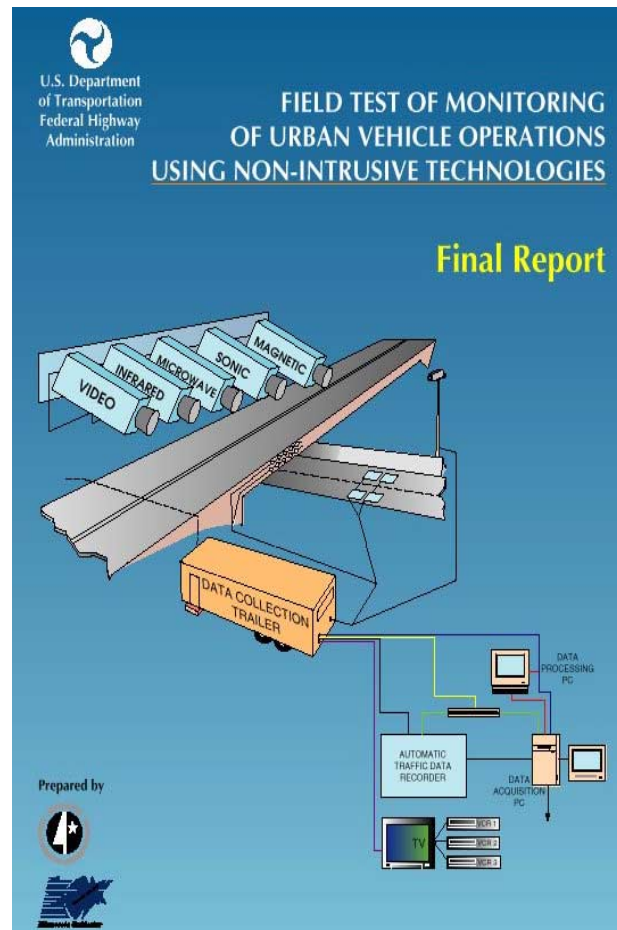
- Data Collection - October
- TWG Team - in process
 - Meeting at NATMEC - August 29
- Goals and Objectives - final review
- Develop Evaluation Test Plan -
In process

NIT I Overview

- Hughes Project - 1992 to 1994
- NIT 1 - 1995 to 1997
- NIT 1 Test Sites
 - Freeway Test Site
 - Intersection Test Site
- NIT 1 Final Report Completed May 1997

NIT Phase I Report

www.dot.state.mn.us/guidestar



NIT I Goals

- Evaluate Capability of Technology
- Evaluate Weather Conditions
- Evaluate Impact of Traffic Levels
- Evaluate for Historic Data
 - Volume
 - Secondary Speed
 - Some Classification

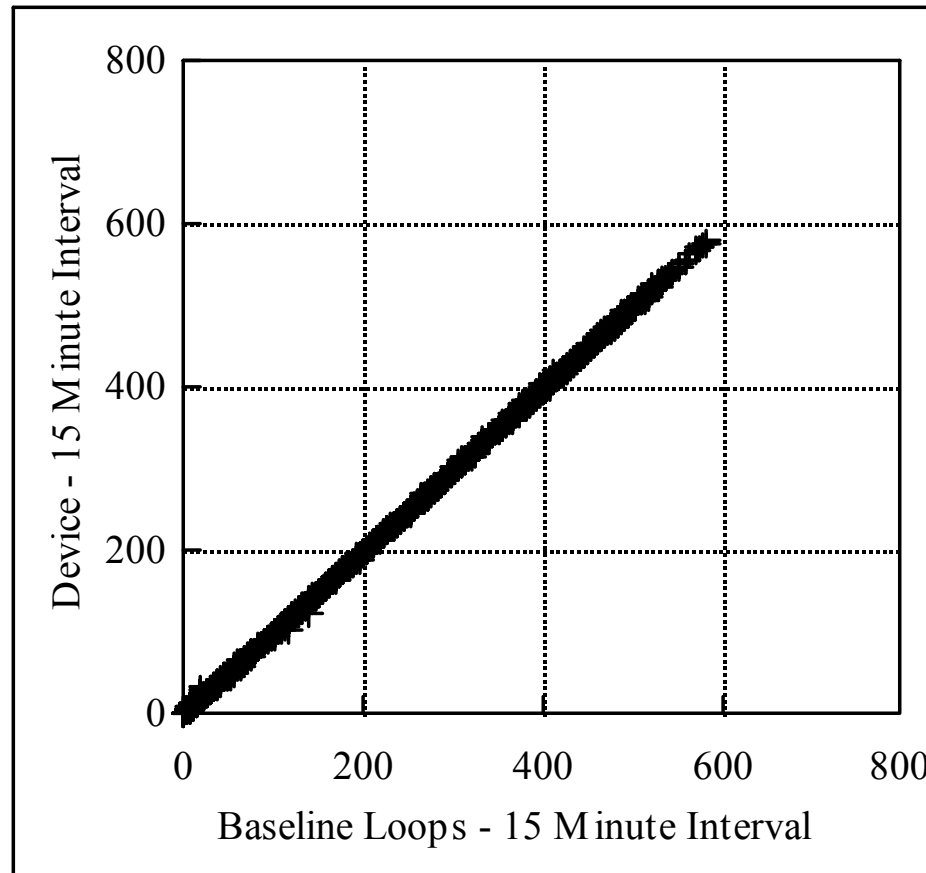
NIT I Vendors

- Eltec
- ASIM
- Schwartz
- Safetran
- EIS
- PEEK Traffic
- Whelen
- Peek Transyt
- ELIOP
- ISS
- Rockwell
- Novax
- Microwave Sensors
- IRD

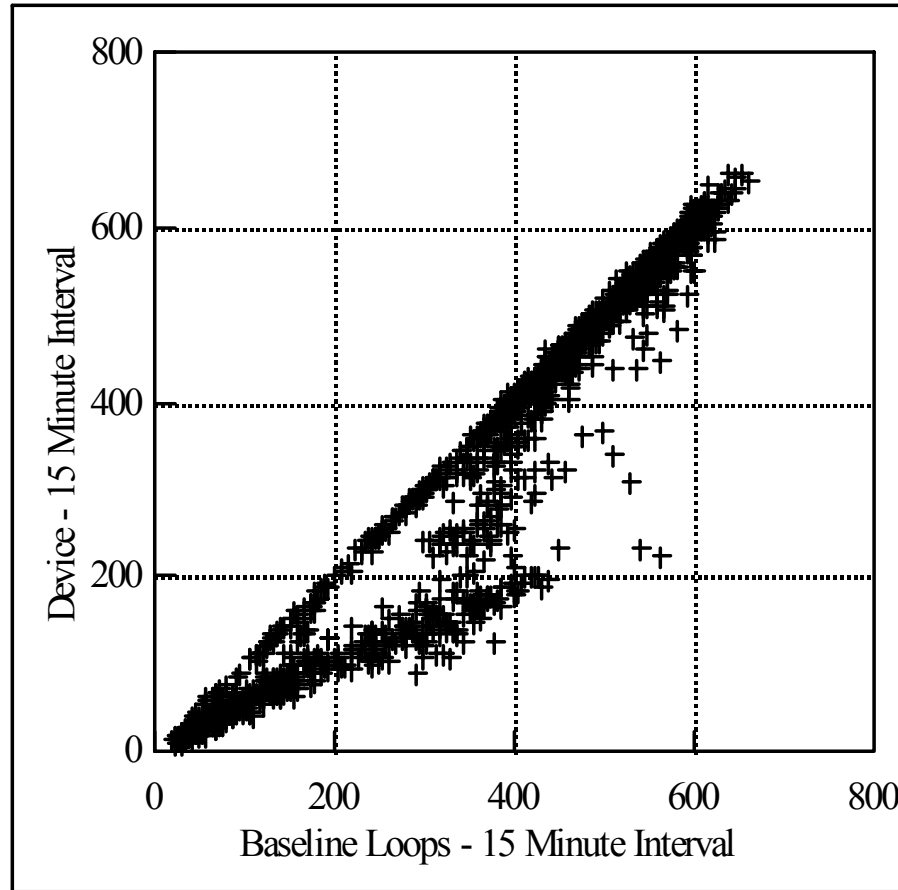
NIT 1 Results - Weather

- Overall weather had minimal effect
 - Snow caused vehicle shift
 - Wind and lighting affect video
 - Wet pavement affect Laser
 - Low temps affect passive acoustic and passive magnetic
 - Rainfall had no effect

NIT 1 Results



NIT 1 Results



NIT 1 Conclusions

- Most devices suited to temporary applications
- Performance varies little from technology to technology
- Heavy traffic had minimal effect at freeway
- Intersection counting not as accurate

NIT 1 Conclusions (continued)

- Factors to consider
 - Ease of installation and maintenance
 - Mounting flexibility
 - Power supply needs
 - Amount of vendor support

NIT II Overview

- Technical Working Group (TWG)
 - Formed 1997
 - Informal 8/29/00 5:30 – 7:00 p.m. Salon F
 - Meet fall 2000
- Create Evaluation Test Plan
 - Expand to include real time/ITS applications
 - Standard Test Procedures
- Work in progress: what are user needs?

Conclusion

- Make results useful to a national audience
- Establish standard approach
- Perform fair and comprehensive evaluation
- Stay flexible - respond to emerging needs

Thank You

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Technical Working Group Meeting

August 29, 2000

NIT Project Overview

- Phase I Overview
- Phase II Update
- Technical Working Group Background
 - 1997 Survey Findings
 - 1997 Workshop Findings
 - Identify detection applications
 - Identify data parameters

Goal 1: Develop Standardized Procedures

- Develop standard test procedures
 - Makes results useful to national audience
 - Makes tests repeatable by other agencies
 - Reduce amount of duplicate testing
 - Coordinate with other standards (ASTM)
- Develop standard statistical procedures
 - Make results easy to interpret
- Develop standard report guidelines

Goal 2: Historic Applications

- Examine mounting parameters
- Examine during varied traffic conditions
- Examine various roadway types
- Examine various weather conditions
- Also examine detection of bike/ped/train

Goal 2: Historic Applications - Cont.

- Core traffic parameters:
 - Volume
 - Speed
 - Classification
- Extended list:
 - Queue length
 - Vehicle stops
 - Turn moves
 - Direction of travel

Goal 3: Real time/ITS Applications

- Mounting...
- Traffic...
- Roadway...
- Weather...
- Bike/ped/train...

Goal 3: Real time/ITS Applications - Cont.

- Core Traffic Parameters:
 - Volume
 - Speed
 - Classification
 - Presence
 - Lane Occupancy

Goal 3: Real time/ITS Applications - Cont.

- Extended List:
 - Queue length
 - Vehicle stops
 - Headway
 - Travel time / delay
 - AVI
 - Enforcement
 - Turn moves
 - Direction of travel
 - Vehicle height
 - Vehicle occupancy
 - Vehicle tracking

Goal 4: Document Deployment Issues

- Installation issues
- Maintenance issues
- Operational issues

Goal 5: Document Costs

- Device cost
- Installation cost
- Maintenance cost
- Operational cost

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